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Malgorzata Ogonowska, Dominique Torre

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Malgorzata OGONOWSKA† Dominique TORRE†

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Abstract

Since 1990s environmental protection and awareness became major issues. Consumers are more and more aware of environmental issues and conscious of existing pollution caused by mass tourism. Consequently a new segment of demand desiring sustainable tourism products have appeared, enhancing service providers to offer this type of products. This paper analyzes the evolution of service provider's offer adapting to demand preferences modification. Using a theoretical framework, it explains how environmental quality standards can become general norms in tourism industry. By analyzing a case of monopoly and duopoly, it considers different possible frameworks and strategic choices that may be implemented by the incumbent. Though, it explains the role of industry in the emergence of the new environmental norms.

JEL Classification: L83, Q56

Keywords: Economics of Tourism, tourism products' distribution, sustainable tourism, branding policies, environmental norms.

1 Introduction

Tourism includes a wide range of economic activities that have an important impact on the environment and the local populations of the destinations. Environmental protection and awareness became the major issues in the 1990s when the concept of sustainable development has been introduced in Our Common Future by the Brundtland Commission (World Commission on Environment and Development [1987]). Thus, tourists are more and more aware of environmental issues; consequently the new segment of demand, desiring environmentally responsible products,

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†University of Nice Sophia-Antipolis - GREDEG - CNRS, 250 rue Albert Einstein, 06560 Valbonne, France. E-mail: malgorzata.ogonowska@gredeg.cnrs.fr, dominique.torre@gredeg.cnrs.fr

has appeared. These new concerns modify tourist's perceptions of destinations, of accommodation brands and of intermediaries distributing tourism products (tour operators, on-line and off-line tourism agencies etc.). The supply of tourism products has to adapt to these moving norms. A new concept of sustainable tourism has been developed and became an important issue in tourism related literature. According to *Associazione Italiana Turismo Responsabile* (quoted by Cracolici, Cuffaro, Nijkamp), sustainable tourism is defined as "every tourism activity that preserves for a long time the local natural, cultural and social resources, contributing to the well-being of individuals living in those tourist areas".

Meanwhile, two segments of demand co-exist: consumers who are environmentally aware and search for sustainable tourism products, and those, who are more interested in other characteristics of the offered services *(e.g.* prices, luxury standards etc.). This paper tries to describe the evolution of the offer of a company adapting to modification of consumer preferences. In order to consider those questions, this paper is organized as follows. *Section 2* presents the contributions of the literature on sustainable tourism and on strategies of pricing and distribution of tourism products. This literature review indicates the positioning of this paper - on the crossing of those two specific types of issues. Then, in *section 3*, the model and its main results, including branding and marketing issues, are presented. In *section 4* quality enhancement question is considered. Finally, in *section 5* the point is made on potential competitors' entry on the market and thus, on industry role in environmental norms' diffusion, before concluding in *section 6*.

2 Literature review

Literature related to sustainable tourism questions is quite various and thus is interested in diverse economic aspects of those issues. In consequence it can be classified in several categories. First identified category is found on Bramwell's and Lane's definition of sustainable tourism [1993], that is "an economic development model conceived to improve the quality of life for the local community, and to facilitate for the visitor a high-quality experience of the environment, which both the host community as the visitors depends". In this point of view sustainable tourism ought to first of all assure the relationship between the local community and the tourists; in consequence the local governments and administrations should develop appropriate policies (for more information on this issue see Accinelli, Brida and Carrera [2008], Caserta and Russo [2002]). Those policies should also focus on environment protection by enhancing market actors to implement the measures and amenities ecologically responsible. This point was emphasized by Rivera [2002], Shen and Zheng [2010] and Weaver [2005]. In order to smooth the progress of the environmental policies implementation, there is a need to educate the market actors (hotel management, tourism agents, tour operators, administration), as well as, the whole population with the objective to adapt people's perceptions into this new long term vision (Nita and Agheorghiesei [2010]). The implementation and adaptation of amenities and equipment more respective of environment can be impelled by demand's desires, which compose the second identified category of the literature.

The environmentally aware tourist's segment may influence the service providers to invest in their facilities modernization to make them more ecological (Accinelli, Brida, Carrera and Pereyra [2007], Brau [2008], Claude and Zaccour [2009], Minciu, Popescu, Padurean, Hornoiu and Baltaretu [2010]). In order to get the return on his investment, service provider may increase the prices of products including "green" amenities in comparison to traditional (more "polluting") products. Finally, price discrimination practices are also observed in natural reserves tickets pricing. Indeed local visitors (verified in the 3rd world countries) pay lower fees then the other tourists (for more extensive analysis on this issue see Becker [2009], Walpole, Goodwin and Kari [2001]).

None of the existing papers of sustainable tourism literature is concerned by the questions of ecological products pricing (besides the issue of natural reserves tickets pricing) and the strategies of their distribution. For that reason this paper combines the contributions of the articles on sustainable tourism with those developed in the literature on tourism products distribution and price discrimination strategies (Clemons, Hann and Hitt [2002], Gallego and van Ryzin [1994], Fay [2008], Fay [2008], Feng and Xiao [2000], Fleishmann, Hall and Pyke [2004], Fleishmann, Hall and Pyke [2004], Shapiro and Shi [2008], Stokey[1979], Zhao and Zheng [2000]).

3 The emergence of environmental norms

This paper describes the evolution a service supplier's offer adapting its range of tourism products to consumers' preferences changes. These preferences are particularly influenced by progressive awareness of a number of consumers of environmental risks generated by tourism. If/when this sub-population becomes sufficiently large and active, a demand-pull movement generates changes in supply of tourism products. These changes are oriented to diversification of products offered by the traditional brands, who develop rather basic quality sustainable tourism products.

3.1 The benchmark case

Initial state corresponds to lack of any information on the pollution driven by mass tourism. In this case, tourists are not concerned with environmental issues and are interested in acquiring traditional/standard tourism products. The service provider producing tourism goods and services offers only this category of products. Accordingly, if n potential tourists have the same propensity to pay related to level of parameter α; $\alpha > 0$ in their utility function measures in monetary terms the satisfaction that they draw from the consumption of traditional tourism product. All potential tourists purchase or not the standard tourism product, according to the price of this good. If p_T figures the price of this product, the net utility of potential tourists is given by equation (1):

$$u_T = \alpha - p_T + \beta \tag{1}$$

where β is an index of quality of the product.

Potential tourists choose to purchase the standard product if $u_T \geq 0$ and to reserve in the opposite case.

The service provider, who produces without costs in a situation of monopoly, determines the price maximizing its profit. This price extracts the total consumers surplus and is given by $p_T^* = \alpha + \beta$. Then, profit depends only on the number of potential tourists and is given by $\pi_T^* = n(\alpha + \beta)$. All potential tourists finally purchase the traditional product and pay the reservation price.

3.2 The rise of environmental issues

This second stage captures the service provider's and potential tourists' decisions related to the rise of environmental issues. Available public information on pollution caused by standard tourism products progressively generates a movement of distrust towards traditional products and split the consumers in two subpopulations. New segment of environmentally conscious tourists m_0 $(0 < m_0 < n)$ appears. The utility that they draw from the consumption of traditional products decreases, as these products are now perceived as generating pollution and is now given by (2):

$$u_T^G = \alpha' - p_T + \beta \tag{2}$$

with $\alpha' < \alpha$. For the remaining $(n - m_0)$ potential tourists, utility of consuming a traditional product is still given by (1).

Since the service provider cannot apply a first degree price discrimination, he has to choose between charging the previous price $p_{T1} = p_T^* = \alpha + \beta$ but then only $(n - m_0)$ tourists buy the product and the profit is $\pi_{T1} = (n - m_0)(\alpha + \beta)$, or a lower price $p_{T2} = \alpha' + \beta$ and the profit is then $\pi_{T2} = n(\alpha' + \beta)$. In both cases, the new profit is smaller than $\pi_T^* = n(\alpha + \beta)$.

The service provider can then adapt to changing preferences and offer also a sustainable product, generating few or no environmental damages. The quality of this product is rather low (ex: hiking packages/services) and given by $\gamma < \beta$. The utility that environmentally conscious consumers m_0 draw from the consumption of this sustainable tourism product (labeled *g1*) is given by (3):

$$u_{g1}^G = \alpha'' - p_{g1} + \gamma \tag{3}$$

where the parameter $\alpha'' \geq \alpha$ represents the propensity to pay for the sustainable product of environmentally conscious tourists. If the quality of the *g1* sustainable product incurs no additional costs, the service provider is now able to differentiate his offer if $\gamma \geq (\alpha' - \alpha'' + \beta)$. In this case, the service provider continues to charge the reservation price p_T^* for the standard product, which is consumed by the $n - m_0$

traditional tourists, and charges the price $p^*_{g1} = \alpha'' + \gamma$ for the sustainable product which is consumed by environmentally conscious population. Now, service provider's profit is $\pi^*_{T/g1} = m_0(\alpha'' + \gamma) + (n - m_0)(\alpha + \beta)$ and it can be smaller or larger than the initial π^*_T according to the respective values of α'', β and γ. Whatever the values of parameters are, $\pi^*_{T/g1}$ is larger than service provider's profit when he serves all consumers by offering traditional product only.

3.3 The dynamics of environmental conscious tourists population

The population's sensibility to environmental issues depends on exogenous and endogenous factors. Scientific information on nature and causes of environmental damages constitutes an exogenous origin of emergence and/or growth of the environmentally conscious population. Awareness of environmental issues changes also rapidly in all countries around the world, according diverse circumstances as natural disasters, national and international information campaigns, education, political interventions... These events can be assimilated to exogenous shocks defining initial conditions of dynamics or modifying unexpectedly its path. After a given shock generated by one of these events, stylized facts show that two dynamics are possible. If the shock is too small or "negative", population considering ecological issues as important rapidly decreases to zero. Such situation has been observed for instance in some European countries few years after the Chernobyl disaster in the 1980s or several years after the first communications on greenhouse effect during the 1990s. If the initial shock's amplitude is sufficient, the "ecological messages/values" are more or less rapidly spread among the population [1]. The number of environmentally conscious tourists then varies from one period to another. This variation depends mainly and positively: on one hand on the current number of environmentally conscious tourists who spread the ecological message and promote the "sustainable tourism"; on the other hand, on the environmental damages generated by standard tourism. To capture this dynamics the following expression (4) is chosen:

$$m_t = \max\left(n, \min\left[0, a\left(m_{t-1} - \frac{b}{i}\right)(n - m_{t-1}) + \frac{b}{i}\right]\right) \tag{4}$$

where $i > 0$ stands for the quality/intensity of the exogenous information while a and b are parameters, with $0 < a$, and $0 < b \ll 1$. It can be easily verified that the population of environmentally conscious tourists has then three stationary equilibria corresponding respectively to $m^* = 0, m^\dagger = \frac{b}{i}$ and $m^{**} = n - \frac{1}{a}$ (*see appendix 1*). Only m^* and m^{**} are stable under adaptive expectations while the second stationary solution $m^\dagger$ is unstable under the same expectations. We can furthermore observe the following interesting result:

Proposition 1.
(i) All things being equal, all increase in the information about environmental issues increases the probability of convergence toward a stationary equilibrium with a large

[1] Katrina hurricane or Fukushima nuclear disaster created such reactions in Europe, North-America and Japan.

proportion of environmentally conscious tourists and a low level of environmental damages/pollution generated by tourism.
(ii) All things being equal, a sufficiently large environmental shock tends to generate dynamics of convergence toward a stationary equilibrium with a large number of environmentally conscious tourists and only few environmental damages generated by tourism. Too small environmental shocks have only temporary effects and are not able to generate a large population of environmentally conscious tourists.

Proof: *see appendix 1.*

3.4 Sustainable brand and new forms of marketing

When pollution persists, environmentally conscious consumers become more sensible to ecological issues and they refuse to buy anything from a company who distributes also polluting products. Formally speaking, the equation (3) stops to represent the environmentally conscious tourists' utility provided by sustainable products. In this expression, α'' progressively falls to 0: environmentally conscious tourists then choose the reservation strategy, or, in other words, boycott all the service provider's products. When m_t is quite important, this boycott decreases drastically the profit of the firm. His reaction could be to offer quite the same sustainable tourism product but under another brand name, while still distributing traditional product under the same previous brand name. This double branding strategy includes additional costs c for the service provider corresponding to creation of new "ecologically responsible" brand and in maintaining its quality and confidentiality of its parent company in order to preserve its reputation. In this particular setting the environmentally conscious tourists' utility for the consumption of the sustainable tourism product returns to the previous level:

$$u_{g2}^{G} = u_{g1}^{G} = \alpha'' - p_{g1} + \gamma \tag{5}$$

but the environmentally conscious tourists population has grown to m_1. Given that each sub-population pays the corresponding reservation price , the service provider's profit is now $\pi_{T/g2}^{*} = m_1(\alpha'' + \gamma) + (n - m_1)(\alpha + \beta) - c$ and it could still be smaller than $\pi_{T/g1}^{*}$ if α'' remains close to α.

As the proportion of environmentally conscious tourists moves during time it is not easy for the service provider to choose a long run policy. Two movements can interfere: (i) the dynamics of m_t described by equation (4) is not always regular and can at some stages move towards m^{**} high equilibrium in an oscillatory way. The quality of available information spread by researchers can also change and accelerate the convergence. New environmental shocks can also occur, changing sometimes the convergence path followed by tourists' population. Last, environmentally conscious tourists, now informed of the financial links between the new "sustainable" brand and the traditional brand, distributing standard products, can boycott the sustainable products offered by the new brand. The service provider then needs more definitive policy.

4 Investing in quality

The growing number and influence of potential environmentally conscious tourists progressively encourages the service provider to enhance the quality of sustainable product. This action has two consequences. First, it attracts tourists initially not interested in sustainable tourism products. Second, it erases the service provider's bad reputation associated to him offering under different brands traditional and sustainable products. Environmental norms progressively are then imposed to the whole population of potential tourists. The traditional products then disappears from the monopolist's offer.

The sustainable tourism products that have been considered until now are low quality products in which traditional tourists are not interested. After the failure of the new "sustainable" brand, the service provider has two technological and commercial possibilities. The first is to stop offering standard products. In this case, his bad reputation disappears for the environmentally conscious tourists who then draw from sustainable products the utility given by (3). Hence, the service provider saves the cost c (as there is no more product differentiation necessary) while the utility for these products is given by (6) for the traditional tourists:

$$u_{g3}^{T} = \alpha - p_{g3} + \gamma \tag{6}$$

As the service provider cannot price discriminate his clients, he will set the price $p_{g^3}^{*} = \alpha + \gamma$, lower than $p_{g^2}^{*} = p_{g^1}^{*} = \alpha'' + \gamma$ but acceptable to all potential tourists. The profit is then $\pi_{T/g3}^{*} = n(\alpha + \gamma)$, smaller than π_{T}^{*} but probably greater than $(n - m_1)(\alpha + \beta) - c$ which the service provider would get if only traditional tourists have been served in the case of boycott.

Another possibility is to enhance the quality of the sustainable tourism product. This improvement involves specific and costly investments. For example, the hotel should be heated with renewable energy, gather rain water, engage in an environment protection policies.... All these improvements incur additional costs c', with $c \ll c'$[2]. The advantage of this solution is that the whole population are provided with the same high quality product. If this quality is appreciated at the level γ' by all tourists, the utility of tourists' population not interested in environmental issues is now given by (7) and the utility of environmentally conscious tourists is expressed by (8):

$$u_{g4}^{T} = \alpha - p_{g4} + \gamma' \tag{7}$$

$$u_{g4}^{G} = \alpha'' - p_{g4} + \gamma' \tag{8}$$

[2]In order to simplify the comparison, this cost is limited to fixed annual cost. The introduction of variable costs does not however modify fundamentally the results.

The service provider then charges the reservation price of "'traditional"' tourists and the profit becomes $\pi^*_{T/g4} = n(\alpha + \gamma') - c'$ which has to be compared with $\pi^*_{T/g3}$ in order to decide if the investment in quality is the good solution. In such case, the environmental standards finally become general norms. The comparison provides the condition (14):

$$\gamma' \geq \gamma + \frac{c'}{n} \tag{9}$$

It is amazing to observe that the radical decrease in the environmental damages generated by tourism appears as a consequence of a modification in supply, driven by modification a group of consumers preferences: even traditional tourists - indifferent to ecological values - then consume sustainable products.

5 New competitors and the industry role in environmental norms' diffusion

In the previous sections, we have supposed that the service provider is in a position of monopoly. A first extension would be to consider many incumbents competing in both segments of traditional and environmentally sustainable tourism products. The point would then be to delineate the relative relevance of the equilibriums of the industry with and without specialization. A less classic extension would relate to the incidence of the adoption of environmental norms on the competitive structure of the industry. We tackle this issue in a first subsection by considering the consequence of the new choices of the incumbent on the strategies of potential entrants. We finally consider in the following subsection the possible role of the industry in the diffusion and promotion of the norms.

5.1 Reputation and new competitors' entry

When environmental norms make the product homogeneous after the sustainable product quality's improvement, price increase associated to this quality improvement opens the possibility for a potential entrant to make a new offer on the traditional market. Given that this entrant could limit its offer to the traditional product, its costs being smaller than incumbent's costs before the quality improvement of the sustainable tourism product. In this new situation, the traditional product is offered by the entrant to tourists not interested in environmental issues. The utility of tourists interested in traditional product is now given by expression (10):

$$u_e^T = \alpha - p_e + \beta \tag{10}$$

where p_e figures the price of the traditional product offered by the entrant. This price is determined by the entrant given the possible reactions of the incumbent. The last chooses among three strategies:

1. coexistence strategy: in this case, the incumbent accepts to specialize in sustainable product. Its price can be enhanced at the level of the environmentally conscious population's reservation price. The price p_{g5} of the sustainable product then extracts the whole consumer's surplus of this population and the incumbent's profit is given by (11):

$$\pi_{g5} = m_1(\alpha'' + \gamma') - c' \tag{11}$$

2. elimination strategy: in this case, the incumbent finds profitable to compete in price with the entrant. He decreases his price from its initial level p_{g4} to attract "traditional" tourists interested in the traditional product offered by the entrant. The entrant has to decrease his price. The elimination price corresponds to incumbent's price of the high quality sustainable tourism product and making the entrant's profit entrant equal to zero. This elimination price p_{g6} solves the equation $\alpha - p_{g6} + \gamma' = \alpha - p_e + \beta$, where $n - m_1(\alpha - p_e + \beta) - c_e = 0$, *i.e.*, $p_e = \alpha + \beta - \frac{c}{n-m_1}$. Finally, $p_{g6} = \gamma' - \beta + \frac{c_e}{(n-m_1)}$. Then, incumbent's profits when implementing the elimination strategy, is given by expression (12):

$$\pi_{g6} = n\left(\gamma' - \beta + \frac{c_e}{n - m_1}\right) - c' \tag{12}$$

3. back to the low quality sustainable tourism product: in this case, the incumbent decides to reduce the quality of the sustainable product to its previous level. The price is then $p_{g3} = \alpha + \gamma$ and the profit is given by (13):

$$\pi_{g3} = n(\alpha + \gamma) \tag{13}$$

At this stage, relations between the incumbent and the entrant can be considered as a game in which the incumbent is the leader as he has the possibility to choose among the three possible strategies while the entrant can only answer either by offering traditional product at price $p_e = \alpha + \beta$ in cases 1 and 3, or by renouncing to offer traditional product in case 2. The figures illustrate some of the possible outcomes of the game, according to the values of different relevant parameters.

According to figures 1 the strategy chosen by the incumbent depends, first of all, on proportion of potential tourists interested in sustainable tourism products m over the overall population of potential tourists, then on the level of costs c' and c_e and finally, on the quality of the sustainable tourism product. Depending on the levels of those parameters, each strategy might be the best choice for the incumbent. Indeed, on the one hand, if the number of tourists interested in sustainable products is low compared to the whole potential tourists population, the best solution would be the third strategy *i.e.* the service provider should choose to offer a low quality sustainable product. On the other hand, if the proportion of tourists interested in sustainable tourism products is relatively high among the overall potential tourists population, the incumbent will offer a high quality sustainable product. If this number is extremely high, as well as the quality of the product he offers, and the traditional product's quality, offered by a potential competitor is rather high and so

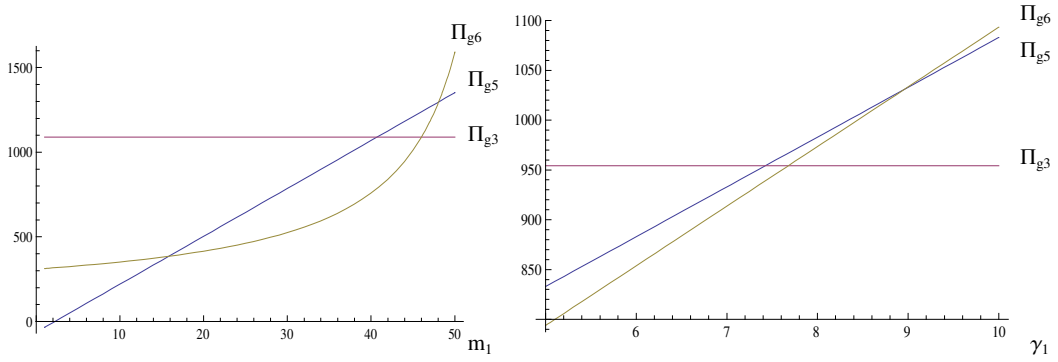

Figure 1: Comparison of incumbent's profits while implementing coexistence, elimination and no quality enhancement strategies

are the costs he incurs, the incumbent chooses the second strategy *i.e.* to eliminate the entrant by practicing elimination price. Finally, the first strategy of coexistence with the entrant is chosen, if the proportion of tourists interested in sustainable tourism products is relatively high among the overall population, but not extremely high, as well as the quality of the sustainable tourism product.

A comparison of the profits given by (11), (12) and (13) provides also the following results:

Proposition 2.
(i) All things being equal, the "back to the low quality" tends to be the incumbent's equilibrium choice when the population of environmentally conscious tourists is low. When it increases, the coexistence strategy with a high quality sustainable product is chosen. When the population of environmentally conscious tourists is very large, the elimination strategy dominates.
(ii) All things being equal, all increase in quality of the sustainable tourism product tends to make irrelevant the "back to the low quality" choice and to promote first the coexistence case, then the elimination strategy.

Proof: *see appendix 2.*

This result shows that the competitive consequences of emergence of environmental norms are not fully predictable. Some tendencies however emerge while population of environmentally conscious tourists and the sustainable product's quality increases: the specialization of different suppliers in different segments is the more likely to appear when the population of tourists not interested in environmental issues is still consequent. The entrant's elimination, however, occurs when the proportion of the "'traditional"' tourists declines and makes entry costs too important. Still, it should be noted that as the costs of entry are essentially fixed costs, elimination should not occur when the quality of sustainable products increase slowly and the "'traditional"' tourists population decreases slowly. In this case, the fixed costs would be already amortized when the elimination attempt is initiated by the incumbent, and given the reservation price of the entrant being then close to zero,

the elimination attempt fails.

5.2 Consolidating the environmentally conscious tourist's community

The proportion of environmentally conscious tourists depends on exogenous factors (public news, ecological shocks, extreme meteorological events...). Public scientific informations also has an impact on population's interest in environmental issues and norms. The proportion of environmentally conscious tourists then evolves during time according to endogenous network effects. Until now, it was considered that these movements create new constraints for the tourism industry suppliers who react passively to the norms and mentalities' evolution. The previous section, however, shows that the changes of environmental norms can generate two different consequences in competitive environment of a given service supplier. When the tourists population is divided in two sub-populations of quite the same importance, the situation is more critical for the incumbent who is frequently under pressure of a competitor, who can take a part of its market shares. In this case, the supplier can add its own private contribution to the public information on the ecological damages caused by traditional tourism products.

In situation when changes generated by environmental norms have possible impact, it could spread additional information on environmental damages. This information, labeled j, to distinguish it from the scientific information i, has an important consequence - it provides a pure exogenous signal that could increase tourist's sensibility to environmental issues. Equation (4) then becomes (14):

$$m_t = \max\left(n, \min\left[0, a\left(m_{t-1} - \frac{b}{i}\right)(n - m_{t-1}) + \frac{b}{i} + j\right]\right) \tag{14}$$

The consequence of this additional incumbent's contribution to available information is then to change the out of equilibrium network dynamics, without moving the stationary equilibrium of the populations (see Appendix 3).

6 Concluding remarks and further research

The paper analyses evolution of service provider's offer, in the situation of monopoly, adapting to demand preferences' modification. As consumers become progressively more and more aware of environmental damages caused by massive tourism, because of public information on pollution becoming available, a sub-population of environmentally conscious tourists, desiring sustainable tourism products, appears. Progressive growth of this subpopulation, driven by information's spread, leads the service provider to diversify his offer by developing sustainable tourism product. As environmentally conscious tourists become even more sensible to ecological issues and boycott the products distributed by service provider, who offers as well traditional products, service provider develops new specific brand in order to distribute sustainable tourism product. This double branding strategy, implying additional

cost in order to preserve its good reputation, enables the service provider to price discriminate his clients. However this situation, beneficial for the service provider, may last only for the short period of time, as the supplier cannot indelibly conceal financial links existing between the two brands. In order to avoid another boycott movement the service provider adopts a "all-sustainable" strategy - he distributes sustainable product only. In order to satisfy the whole population, as there are still some tourists more interested in luxury standards than in ecological issues, he enhances the quality of the distributed product, that incurs an additional cost related to specific investments. In this situation, ecological standards become general norms.

The main danger resulting from the "all-sustainable" strategy is then that environmentally conscious population imposes environmental norms to the rest of the population. This situation attracts a new entrant who for instance distributes standard/traditional products only, at a very advantageous price such as traditional tourists (not interested in environmental issues) could choose the cheaper traditional product. Then, the strategy chosen by the incumbent depends on the proportion of environmentally conscious tourists among the whole tourists population, on the sustainable tourism product's quality level and on both suppliers costs' levels. Main results of this paper are that, if the number of environmentally conscious tourists is low, the service provider/incumbent chooses to lower the sustainable product's quality to its previous level in order to lower the price of this product and thus, to serve out all the consumers and maintain all its market shares. Otherwise, if the proportion of environmentally conscious tourists is relatively high, the service provider chooses a co-existence strategy with the new entrant and supplies only this subpopulation and lets his competitor offer traditional product on the traditional market. The third strategy - potential competitor's elimination - is implemented when the environmentally conscious population is extremely high and the quality of the sustainable product offered is also very high. In such situation, the incumbent may lower its price to the level that makes the potential entrant's profits equal to zero. This strategy is quite complicated to implement as it requires very specific conditions. In most cases the strategy of co-existence dominates, what will in the near future confirmed by an empirical study.

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Appendix 1: Proof of Proposition 1

(i) Figure 2 presents two cases of environmentally conscious tourists' population dynamics. The left-side of the figure presents slow dynamics with a tendency of the population to grow moderately when the proportion of environmentally conscious

tourists is small and the damages are important while it decreases also moderately when the population of green tourists is large and the level of damages - small. The equilibriums m^* and m^{**} are then stable. The right-side corresponds to rapid dynamics of the population with a strong sensibility to the level of environmental damages and to the number of already environmentally conscious tourists. In this case also the two equilibriums m^* and m^{**} are stable.

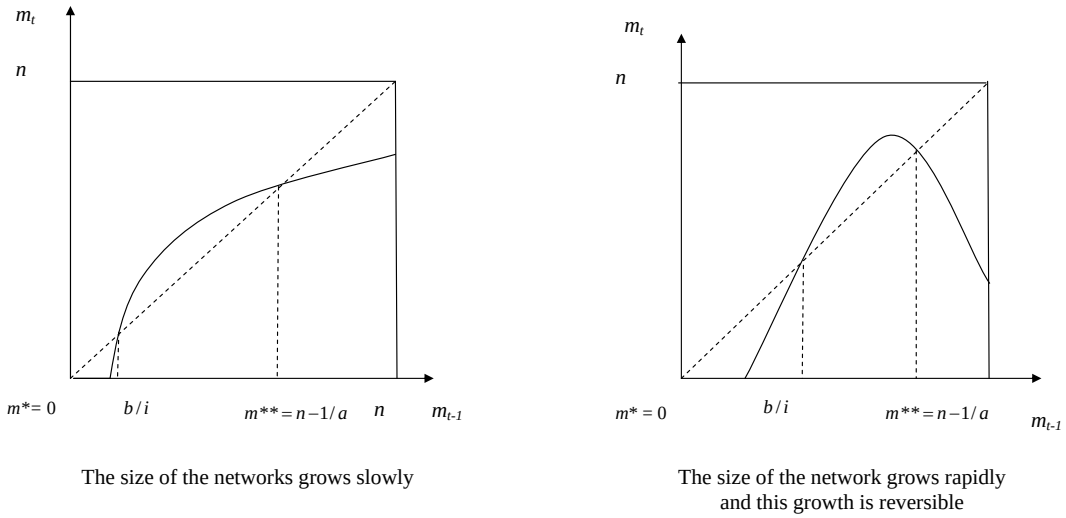

Figure 2: Dynamics of the environmentally conscious tourists' population

(ii) Small positive shocks in case of small proportion of environmentally conscious tourists generate a short term increase of this population, with a tendency to decrease to m^*. When the initial shock or one of the subsequent positive shocks is sufficient to bypass $m^\dagger$, then the dynamics joins more or less rapidly the second stable equilibrium m^{**}.

Appendix 2: Proof of Proposition 2

A comparison of expressions (11) and (13) shows that the coexistence strategy is possible when $m_1(\alpha'' + \gamma') - n(\alpha + \gamma) \geq c'$, which, given that $\gamma' > \gamma$ becomes more probable when m_1 increases. The profit of elimination given by (12) tends to infinity when m_1 is close to n, which makes it - for such values of m_1 - greater than the other profits. From these two observations, the part (i) of Proposition 2 is deduced. Given that only the "back to low quality" profit (13) does not depend positively on γ', the "back to low quality" possibility is progressively crowded out when γ' increases. The two other profits depend positively and linearly on γ' but with a higher coefficient for (12) than for (11). From these comparisons, the second part of the Proposition 2 is deduced.

Appendix 3: Effect of the service providers on the diffusion of environmental norms

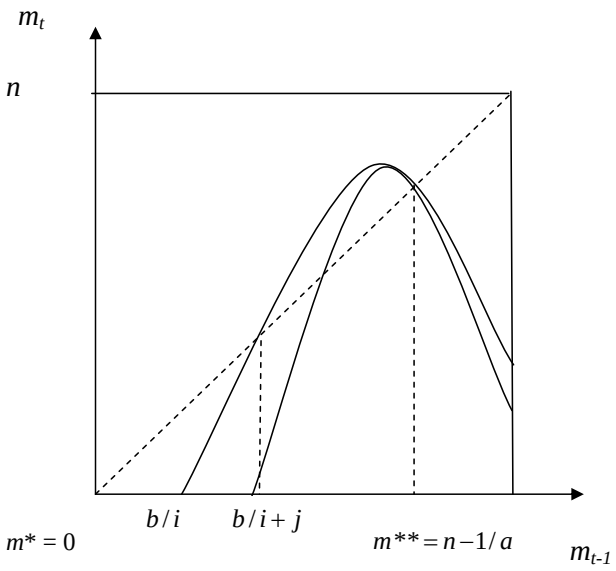

Figure 3: Effects of service providers on the diffusion of norms